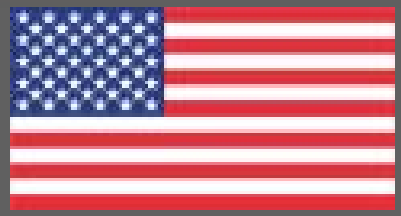
# Mold in Construction



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- **Our discussion of a topic does not change or create insurance coverage- your insurance policy does that.**
- **This class does not, and cannot cover all conditions you may encounter in the real world.**
- **YOU always have FINAL responsibility for YOUR safety.**

# Cost of Mold

- New York City
  - 150 families file suit against housing complex owner claiming failure to eliminate mold.  5 are wrongful death suits.
- Florida
  - Construction defect claim against architect, CM and subs.  $11.5 million awarded

# Cost of Mold

- California
  - $33,000 settlement regarding roof leaks
- Texas
  - $30 million bad faith claim against insurer over mold
    - Reduced to $4 million
- Ed McMahon
  - $20 million against insurer and contractor
    - Settled for $250,000

# Insurance Coverage

- Coverage is major issue at this time
- All insurers are trying to get exclusions
  - $1.2 billion paid out in 2001
  - $2.5 billion paid out in 2002

# Insurance Coverage

Most important thing you can do

is

report potential claims as soon as you are aware of them

# Session Overview

- Health and mold
- Reasons for mold growth
- Prevention
- Assessment guidelines
- Remediation procedures

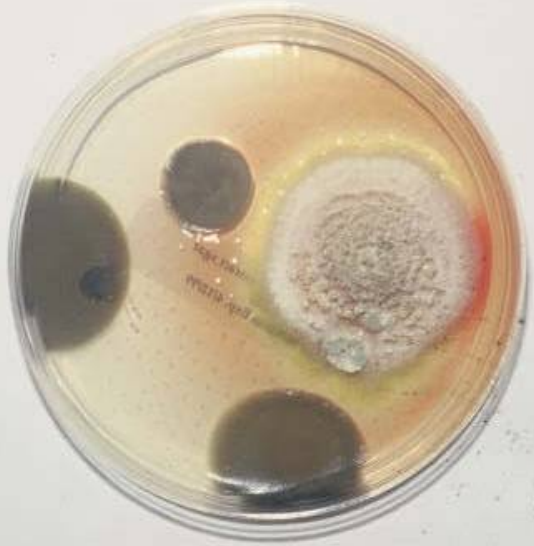
# 30 Second Seminar

- Mold is everywhere
- Only 3 things needed for mold growth
- Mold will always be here
- Can’t eliminate the first two – the only option is #3 – control moisture

# Mold Verses Fungus

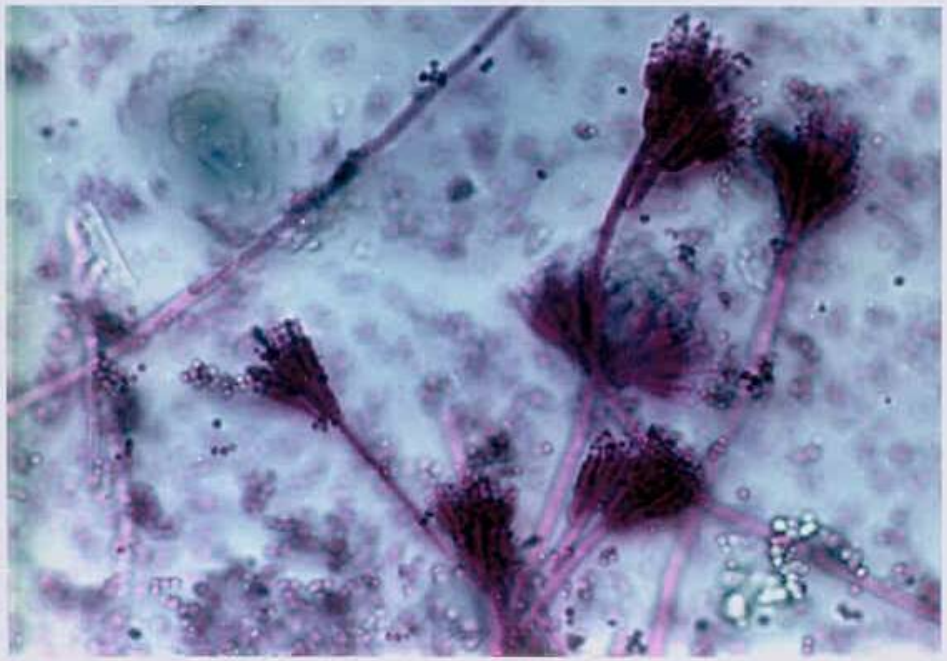
- Fungus is one of the kingdoms (plants, animals)
- Mold is a term of convenience
- All mold is fungus, not all fungus is mold.
- We will use the terms interchangeably

*Aspergillus vulpinum* (green) &
*Cladosporium cladosporioides* (dark)



# Aspergillus ustus

## Penicillium Fungi



# Health and Mold

- Potential mold reactions depend on:
  - Species involved (there are 1000s of them)
  - Metabolic products of species
  - Duration and intensity of exposure
  - Susceptibility of individual
- Just because mold is present does not create a hazard – it is always there.

# Health and Mold

- Allergic reactions – probably the most common response
- Infections – rare (e.g. histoplasmosis). 95% recover naturally. Medical facilities are high risk location.
- Irritation – from chemicals produced by mold.

# Health and Mold

- Mycotoxins – chemicals produced by some (not all) molds.
  - Some extremely toxic – some therapeutic
  - Most have little or no research on health effects
  - Most human disease due to eating contaminated food or huge agricultural exposures – NOT inhalation

# Health and Mold

- Toxic Mold - Stachybotrys
  - 1994 – 10 acute pulmonary hemosiderosis in infants in Cleveland – Stachybotrys found in houses
  - 2000 – CDC study - not enough evidence to conclude an association between indoor mold and childrens' condition
  - CDC position on health effects – no consensus

# Health and Mold

- Texas Medical Association – Council of Scientific Affairs

No evidence that Stachybotrys causes serious health problems or aggravates existing health conditions.

*Houston Chronicle  22 Sept. 2002*

# Health and Mold

"Levels of exposure in the indoor environment, dose-response data in animals, and dose-rate considerations suggest that delivery by the inhalation route of a toxic dose of mycotoxins in the indoor environment is highly unlikely at best……."

American College of Occupational and Environmental Medicine October 2002

# Health and Mold

- Annals of Allergy Asthma Immunology

  Vol. 87 Dec. 2001 p.57-63

  Stachybotrys: Relevance to Human Disease

  Conclusions: The current public concern for adverse health effects from inhalation of stachybotrys spores in water-damaged buildings is not supported by published reports in the medical literature

# Health and Mold

- Annals of Allergy Asthma Immunology
  Vol. 87  Dec. 2001  p. 52-6
  Fungi: Toxic Killers or Unavoidable Nuisances

Conclusions:  The review led to the conclusion that the primary effect from fungal exposure is allergic disease, and that the evidence for inhalation disease resulting from mycotoxin exposure in residential and office settings is extremely weak.

# Medical Tests

- Few medical tests available
- Can only document that exposure has occurred
- Can not determine source, place, time of exposure
- Mold exposure occurs naturally all the time – both indoor and outdoor

# Reasons for Mold Growth

- Primary reason – moisture accumulation
  - Design flaw
  - Construction flaw (e.g. leaky roof, vapor barrier, installation of wet materials)
  - Pipe leak, water overflow
- Growth can start within 48 hrs.

# Reasons for Mold Growth

- Modern buildings seem particularly susceptible – tight construction
- Increase of wall board vs. metal mesh and plaster

# Prevention

- Prevent moisture accumulation
- US EPA study – 45% of office buildings surveyed had active water leaks

# Prevention

- Consult envelope engineer on geometrically complex buildings for water tightness
- Document any recommended changes to Architect of Record.
- If recommendation is rejected copy to owner and your file.
- Don’t just “shrug and build it”

# Prevention

- Renovations or additions – pre-existing mold survey.
- Prequalify potential subs that they have expertise in specific application
- Consult manufactures of moisture critical products:
  - Fitness for intended service
  - Confirm product's proper application
  - Provide preferred installers

# Prevention

- Proper sequencing of work – keep interior materials away from exterior conditions
- Inspect materials at delivery
  - Pre-existing mold
  - Proper moisture content per manufacturer
- Storage
  - Dry location
  - Off the ground
  - Loose tarps or sheets to allow air flow

# Prevention

- Be sure foundation is dry
  - Drain away
  - Slope away
  - Roof drains properly supported and braced
  - Sprinklers will not water the foundation
- Proper insulation on chilled water pipes

# Prevention

- Double check points where moisture may enter
  - Doors
  - Windows
  - Flashings and caulking
  - Waterproof membranes (proper lapping at joints and corners
  - Roofing systems and penetrations
  - Balconies and decks

# Prevention

- Pre-arrange drying equipment
  - Fans
  - Dehumidifiers
  - Wet-dry vacs

# Prevention

- Dry materials as quickly as possible
- If possible, ventilate wall cavity
- Be sure it is safe to use equipment
  - Electrical
  - Ventilation

# Prevention

Hidden moisture during 1993 Mississippi floods.

- Pipe chases/utility tunnels
- Above drop ceilings
- Under carpeting
- Wall cavities

# Prevention

- HVAC system
  - No internal lining – bare galvanized sheet metal
  - Cooling coil drip pans
  - Filters – good quality and in place
  - Humidity levels – 30-50% RH

# Vinyl wall covering traps water

# Prevention - Drywall

- Greenboard – moisture resistant
  - Wax added to gypsum and paper cover
  - More resistant to moisture uptake
  - Cost increase to use greenboard throughout
    1 study – 0.08 – 0.6% increase

- Capillary breaks or moisture barriers between gypsum and masonry materials

# Prevention

- Double check all water lines
  - Proper installation
  - Connections leak tight
  - Proper insulation
  - Multiple checkers for leak detection
- HVAC commissioning – actual air flow tests critical

# Prevention

- Consider interim inspections for mold issues
  - Architect
  - Envelope engineer
  - Mechanical engineer
  - Materials manufacturer’s representative

# Prevention

- New building owners must be trained on:
  - HVAC system
  - Maintenance of structure
  - Water damage
  - Vent moisture appliances
  - Humidity control
  - Sprinkler systems not watering building

# Prevention

- DO NOT use outdoor fungicides for indoor situations.

# QA/QC

- Three steps to quality assurance
  - Build in strict accordance with plans and specifications
  - Design professionals correct flaws in plans and specs that are likely to allow intrusion
  - Document every step, including photos of key installations.

Toxic Mold Part 1
Dave Dolnick
Constructor – Oct. 2001

# Prevention

"If builders and insurance companies aren't sensitive (to mold concerns) then they are provoking people to bring claims to justify their own fears"

Plaintiffs often win cases with the argument that mold growth was exacerbated by the insurance company's or builder's action, but not proof that the mold made them sick.

John Sweeney  Miles & Stockbridge Law Firm

# Assessment

- No generally accepted levels for mold in environment.
- 1986 ACGIH proposes mold TLV
  - 500 CFU/M3 in office environment. Indoor/outdoor ratio should be less than 0.33.
- Guidelines deleted in 1987. Lack of scientific data to support levels and difficulty in interpretation.

# Assessment

- Visual inspection is the most important initial step in identifying a possible contamination problem.
- Testing not required for remediation.
- Lots of variables in air monitoring collection and interpretation of results.

# Assessment

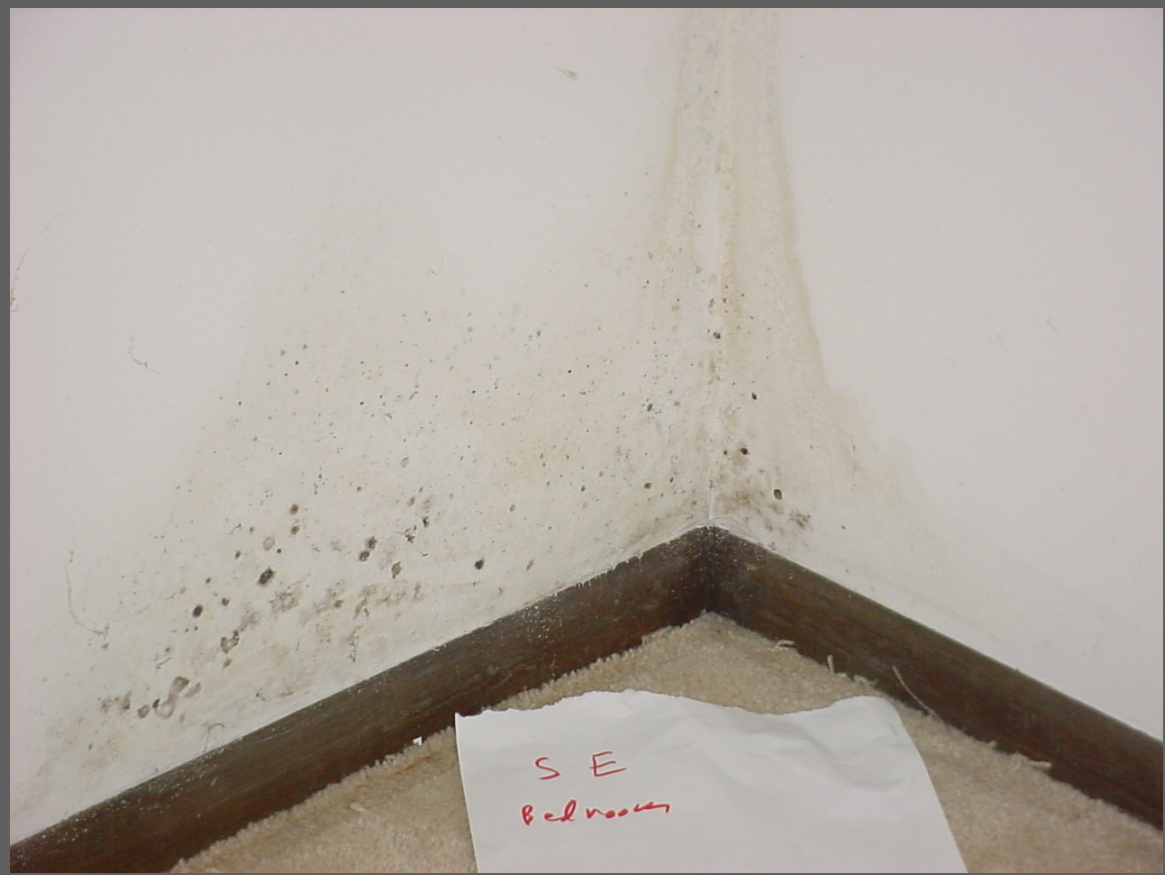
- "Bulk or surface sampling is not required to undertake a remediation." "Air sampling for fungi should not be part of a routine assessment…."

  NYC Guidelines

- "If it is not possible to sample properly, it would be preferable to not sample. Inadequate sample plans may generate misleading, confusing and useless results. US EPA

# Assessment

- Moisture meters
- Mold growth may occur up to 1 meter past high water mark or visual mold
- In addition look for:
  - Earthy, musty odor
  - Discolored plaster, wall board, building materials
  - Suspected water accumulation or intrusion


S E
Bedroom

# Assessment – Air Monitoring

- Simultaneous samples collected in
  - Problem area
  - Outdoors
- Compare results

# Assessment – Air Sampling

- Look for higher levels indoors, or different molds – suggests amplification source
- Can not prove sources of health complaints
- Can not suggest remediation procedures
- Remember – mold is everywhere.

# Assessment – Air Monitoring

- Having said all that:  Situations that require it:
  - Litigation
  - Building management requires evidence that identified source is being spread
  - Building management (occupants) insist

# Assessment – Air Sampling

- “Sampling should be done only after developing a sampling plan that includes a confirmable theory regarding suspect mold sources and routes of exposure.” US EPA

# Assessment – Air Sampling

- What will we learn?
- How and who collects and analyzes samples?
- What criteria to interpret the data?

# Assessment

If you can see or smell mold

you have a mold situation.

May not be a health hazard but it must be addressed

# Remediation

- To conquer mold conquer moisture problems.
- Most important action STOP THE MOISTURE.
- Don’t bother doing anything until the moisture source is eliminated

# Decontamination

- Non-porous materials (e.g. glass, brick, plastic)
- Porous materials (e.g. carpet, drywall, cloth)
- EPA and OSHA do not recommend routine use of bleach or other biocide

# Decontamination

- Read labels
- Follow directions
- Use PPE
- Don’t be Mr. or Ms. Science and start mixing things.

# Decontamination -Drywall

- In some situations – decontaminate and encapsulate
  - Limited mold growth
  - Can access **both** sides of drywall
  - Zinc rich paints can be used to control mold
    - – ShieldZ – Zinzer
    - – Foster 40/20 – H.B. Fuller

# Decontamination

- Ozone generators – not recommended
- UV lights – not recommended

# US EPA Guidelines

- Level 1 – Small areas – 10 ft2 (ceiling tile)
- Level 2 – Medium – 10-100 ft2 (one to several wallboard panels)
- Level 3 – Large – over 100 ft2

- New York City has additional guidance for HVAC remediation

# US EPA Guidelines

- EPA Guidelines assume clean water damage
- Get help for sewage, chemical/biological contaminated water damage
- Everything is just a starting point – each job needs professional judgment

# Workers and Supervisors

- Level 1 – Trained building staff
- Level 2-3 – “Qualified” safety professional makes cases-by-case determination

(From NYC Guidelines)

# Respirators

- Level 1 - N95 disposables or better
- Level 2 - Full face with N100 filters
- Level 3 - PAPR with N100 filters
- Remember OSHA Respirator Program

# Worker Protective Clothing

- All levels
  - Impervious gloves – mid-forearm
  - Goggles – sealed or indirect vent only
  - Disposable coveralls
  - Hand and face washing station

# Containment

- Level 1 – none required
- Level 2 – increasing levels as specified
- Level 3 – under negative pressure similar to asbestos abatement
- All levels – light water misting – not soaking
- Lots of professional judgment is needed here

# Waste Disposal

- Bag
- Rinse
- Toss – check with local authorities just to be sure.  Moldy material is NOT RCRA hazardous waste.

# New Resources

- OSHA Draft Mold Recommendations – release date unknown.  VERY similar to US EPA

- AGC of America – Managing the Risk of Mold in the Construction of Buildings – March 2003
  - www.agc.org

# Regulatory Action

- States planning or taking legislative action
  - Connecticut
  - Massachusetts
  - New York
  - Virginia
  - California
  - Maryland
  - Texas

# Review

- Mold will always be with us.
- Health effects may be scientifically questionable, but public perception is reality.
- To control mold, control moisture.
- Visual inspection is first step in assessment
- No PEL or TLV for mold.
- EPA and NYC have remediation guidelines

# Mold in Construction

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